REMARKS

The Office Action mailed December 12, 2002 has been carefully reviewed and by this Amendment, Applicants have canceled claim 10, amended claims 1-8, and added new claims 11-17. Claims 1, 5 and 11 are independent, and claims 1-9 and 11-17 are pending in the application.

The Examiner objected to the specification and claims 2 and 4 as containing informalities, and required submission of corrected drawings. By this amendment, Applicants have amended the specification and claims to correct the informalities noted therein and have also submitted on a separate sheet a Letter to Official Draftsperson with requested corrected drawings.

The Examiner rejected claims 1-10 under 35 U.S.C. 112, second paragraph, as being indefinite. By this Amendment, Applicants have amended claims 1-8 to correct the informalities noted therein; claim 10 has been cancelled.

The Examiner rejected claims 1-10 under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,076,776 to Yamada et al. ("Yamada") in view of U.S. Patent No. 5,690,972 to Planeta et al. ("Planeta") and U.S. Patent No. 5,738,881 to Sagar.

As set forth in amended claim 1, the present invention is directed to an extruder die head having a central annular channel defined by an inside wall and an outside wall. Internal and external annular slits empty to the inside and outside walls, respectively, feeding polymer melts and forming smaller diameter openings of truncated channels formed between internal and external shells of stacked, conical insert members which form the walls. The internal conical insert members have mating inner and outer conical surfaces or walls which define spiral channels in the inside wall, and the external conical insert members similarly have mating inner and outer conical surfaces which define spiral channels in the outside wall, with the grooves in the inside and outside walls counter-rotating.

The conical insert members include an inside bottom ring having a cylindrical outer wall and a conical inner wall, and an outside bottom ring having a cylindrical inner wall and a conical outer wall. The inside bottom ring and the outside bottom ring have a generally triangular cross-section, with the cylindrical walls of these two bottom rings being in abutment to define therebetween a feed channel communicating with the central annular channel. This is not shown or suggested by the prior art.

Yamada discloses an annular die with planar rings; there is nothing to suggest internal and external conical insert members which include inside and outside bottom rings having a generally triangular cross-section, being in abutment, and having the specific wall construction set forth in claim 1. Nor do Planeta and Sagar provide the necessary disclosure, as neither of these references teach or suggest the bottom rings as claimed. Accordingly, claim 1 is patentable over the prior art and favorable reconsideration thereof is respectfully requested.

In addition, the present invention further includes spiral channels or grooves in the truncated channels formed between adjacent insert members which communicate with the central annular channel to convey the polymer melts. As set forth in amended claim 5, at least one of the external conical insert members is in radial alignment with a corresponding internal insert member, with the respective spiral grooves in the aligned pair of insert members counter-rotating. The prior art of Yamada, Planeta and Sagar does not show or suggest such a relationship as none of these references disclose at least one radially aligned pair of internal and external insert members each having spiral grooves therein that are counter-rotating relative to the other.

Finally, as set forth in new claim 11, the inside bottom ring includes spiral grooves on both the cylindrical outer wall and the conical inner wall, while the outside bottom ring has counter-rotating spiral grooves on the the conical outer wall thereof. There being nothing in the prior art of Yamada, Planeta or Sagar that teaches or suggests spiral grooves on two wall surfaces of an inside bottom ring such as claimed, claim 11 is patentable thereover.

In summary, the prior art references disclose grooves on a single side of a plurality of die members that are arranged in a stacked planar manner (Yamada), with only inner rings (Planeta) or irregularly (Sagar). None of the references teach or suggest interior and exterior rings in abutment and alignment, with an inside bottom ring and an outside bottom ring having a triangular cross-section (claim 1), counter-rotating spiral grooves (claim 5), or grooves on both conical and cylindrical walls of the inside bottom ring (claim 11).

For at least the foregoing reasons, independent claims 1, 5 and 11 are patentable over the prior art and favorable reconsideration thereof is requested. Claims 2-4, 6-9 and 12-17 are also in condition for allowance as claims properly dependent on an allowable base claim and for the subject matter contained therein.

Attached hereto is a marked-up version of the changes made to the application by the current amendment. The attached pages are captioned "Version with Markings to Show Changes Made".

Should the Examiner have any questions or comments, the Examiner is cordially invited to telephone the undersigned attorney so that the present application can receive an early Notice of Allowance.

Respectfully submitted,

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Atty. Docket: P65350US0
Date: April 10, 2003
HBJ:SCB

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

With reference to the substitute specification filed on October 23, 2002, the text from page 4, line 23, through page 6, line 23, has been amended as follows:

--**[0015]** The blown film die head comprises a bottom annular cover 2, which serves to hold conical insert members that are stacked on the cover 2, and [a] top holding [ring] rings 17, 18. [Each] The conical insert [member includes an] members include inside [ring] rings 4, 8, 9 and [a] corresponding outside [ring] rings 5, 10, 11. [Bottom inside] The inside bottom ring 4 has a cylindrical outer wall 44 and a conical inner wall 45. [Both] The walls 44, 45 have [a] spiral [groove] grooves 6, 66, respectively, whose depth tapers progressively toward the top of the groove. [Bottom] The outside bottom ring 5 has a cylindrical inner wall 54 and a conical outer wall 55. Only conical outer wall 55 has a spiral groove 56. [A first cylindrical feed channel 3 is formed between the] The rings 4 and 5[, which] exhibit a triangular cross section[. The ring base faces] and the bases of the bottom rings 4, 5 are screwed or clamped together with the bottom cover 2 in a manner that is not illustrated here. The inside bottom ring cylindrical outer wall 44 and the outside

bottom ring cylindrical inner wall 54 define the cylindrical feed channel 3, and the spiral groove 6[, whose depth tapers off toward the top] becomes slotted helical passages which are indicated by the three grooves 6. Channels 7, feeding a first polymer melt, empty into the bottom of helical passage 6.

[0016] Stacked on the bottom rings 4, 5, which lie in a common plane, are inner middle conical ring 8 and outer middle conical ring 10. The middle conical rings 8, 10 together with the bottom rings 4, 5 define conical [areas with the bottom rings 4, 5 and] melt feed channels 12, 13 which have spiral passages 56, 66[connected to internal truncated conical annular channels 12, 13]. The conical [areas] feed channels are formed by [a conical] an inner middle [inner] ring outer wall 84 with the inner bottom [conical] ring inner wall 45, and [a conical] by an outer middle ring inner [outer] wall 105 with the outer bottom [conical] ring outer wall 55. These conical melt feed channels 12, 13 empty into a central annular channel 1, which is a continuation of the cylindrical feed channel 3 formed between the inside and outside cylindrical shell areas or walls, generally indicated by 108, of the middle rings 8, 10. The conical external shells of the bottom rings 4, 5 have in turn spiral grooves [56,] 66, 56, respectively, whereby the melt feed

channels (not illustrated here) empty into the bottom grooves having the greatest depth.

[0017] Mounted on the middle conical rings 8, 10 are inner top conical [inner] ring 9 and outer top conical [outer] ring 11[,] which define, with the conical external shell areas of the middle rings, melt feed channels 120, 130. The conical [areas] feed channels 130, 120 are formed by [a conical] an inner middle ring inner wall 89 with [a conical] an inner top ring [inner] outer wall 98, and [a conical] by an outer middle ring outer wall 111 with [a] an outer top [conical outer] ring inner wall 110, respectively. Conical melt feed channels 130, 120 empty into the central annular channel 1. The external shell areas or walls of the middle rings 8, 10 have spiral grooves 69, 68, respectively, whose [height] depth tapers off toward the top, on the inner middle [conical] ring inner wall 89 [which meets with] and on the outer middle [conical] ring outer wall 111.

[0018] The internal truncated conical annular melt feed channels 13, 130 and the external truncated conical annular melt feed channels 12, 120 slope in opposite directions at approximately the same angle to the central annular channel 1. The external and internal [truncated conical annular] channels [13] 120, 130 communicate with the central annular channel 1 in

approximately the same radial plane. Also, the external and internal [truncated conical annular] channels 12, [120] 13 similarly communicate with the central annular channel 1. The internal 13, 130 and external 12, 120 [truncated conical] melt feed channels are substantially concentrically spaced around the central annular channel 1. The bottom grooves with the greatest depth are fed by the melt feeding channels 15, 16.

[0019] Mounted on the top conical rings 9, 11 are top [inside and] outside and inside holding rings 17, 18 between which the central annular channel 1 is defined with an annular outlet slit 19. An easy method for assembling the blown film die head together with the bottom cover 2 is to connect the top holding rings 17, 18 with tightening screws.--

IN THE CLAIMS:

Claim 10 has been cancelled and claims 1-8 have been amended as follows:

1. (Thrice Amended) An extruder die head, comprising a central annular channel defined by an inside wall and an outside wall, which is provided with an annular outlet die slit, and into [whose outer limiting wall] said inside and outside walls empty internal and external annular slits, respectively, which feed [a]

polymer [melt] melts and which form smaller diameter openings of truncated channels, formed between internal and external shells of stacked, conical insert members, said annular slits feeding said polymer melts from said truncated channels into [an] said inside [wall of] and outside walls defining said central annular channel, and said internal and external shells of said conical insert members, respectively, having mating interior and mating exterior conical surfaces which define two counter rotating spiral channels, whose depths taper off in a direction of [each smaller diameter opening] said annular outlet die slit, said conical insert members including an inside bottom ring and an outside bottom ring, said inside bottom ring having a cylindrical outer wall and a conical inner wall, and said outside bottom ring having a cylindrical inner wall and a conical outer wall, said cylindrical walls being in abutment to define therebetween a feed channel communicating with said central annular channel, and said inside bottom ring and said outside bottom ring having a generally triangular cross-section.

2. (Twice Amended) The extruder head, as claimed in claim 1, wherein a first one of said [internal and external shells of each insert member define truncated conical channels for feeding

said polymer melts into said central annular channel] spiral channels is formed on said conical outer wall of said outside bottom ring, and a second one of said spiral channels is formed on said conical inner wall of said inside bottom ring.

3. (Thrice Amended) The extruder head, as claimed in claim 1, wherein corresponding pairs of said internal and external annular slits lie in [the] a same radial plane.

4. (Four Times Amended) The extruder head, as claimed in claim 1, wherein said [internal and external shells of said conical insert members are defined by two counter rotating] spiral channels[, whose depth tapers off in a direction of each smaller diameter opening] further include spiral grooves on said cylindrical outer wall of said inside bottom ring.

5. (Twice Amended) A blown film head comprising a plurality of internal and external [shells of] stacked insert members which define a central annular channel having inner and outer walls, [said shells] adjacently stacked internal insert members having mating interior and exterior conical surfaces which [define therebetween a plurality of spiral grooves which]

form internal truncated conical channels spaced around said central annular channel, and adjacently stacked external insert members having mating interior and exterior conical surfaces which form external truncated conical channels spaced around said central annular channel, each of said internal and external truncated conical channels having a respective plurality of spiral grooves and communicating with said central annular channel to cause polymer [melt] melts in said truncated conical channels to empty into said central annular channel to produce multilayered tubes of thermoplastic material, at least one external insert member being in radial alignment with a corresponding internal insert member and respective spiral grooves of said aligned external and internal insert members being counter-rotating.

6. (Twice Amended) The blown film head as claimed in claim 5, wherein said internal truncated conical [annular] channels and said external truncated conical [annular] channels slope in opposite directions at approximately [the] a same angle to said central annular channel.

7. (Amended) The blown film head as claimed in claim 5, wherein said internal and external truncated conical [annular] channels are all in corresponding pairs such that each pair [communicate] communicates with said central annular channel in approximately [the] a same radial plane, respectively.

8. (Amended) The blown film head as claimed in claim 5, wherein a depth of each of said [internal and external shells of said conical insert members are defined by two oppositely spiraled channels, whose depth] spiral grooves tapers off in a direction toward said central annular channel.

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